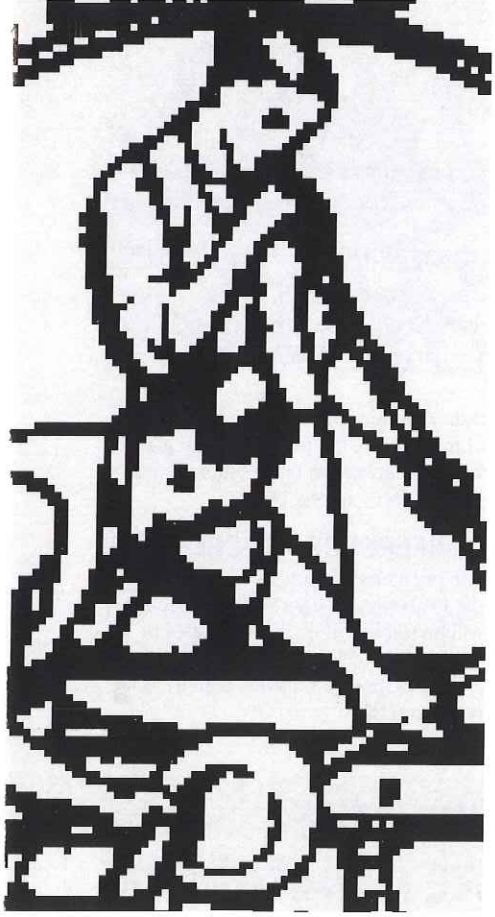

NO. 2 1998

SGT NEWS

Compiled and published by DMG Business Media Ltd on behalf of the Society of Glass Technology

IN PRINT

The April issue of *Glass Technology* features refereed papers on the prediction of optical properties of gradient index rod lenses; a mathematical model of the glass capillary tube drawing process; and compositional dependence of solubility of sulphate in silicate glasses.

Physics and Chemistry of Glasses has refereed papers on: sol-gel with ferric nitrate hydrate temperature dependent transition; reaction between titanium and B_2O_3 melt/glass; characterisation of the structure of binary calcium ultraphosphate glasses by infrared and Raman spectroscopy; the surface chemistry of barium borosilicate glass in aqueous solutions; crystal growth and viscous flow in cordierite and other glasses; structural analysis of GeS_2 glass by means of reverse Monte Carlo simulation; dielectric behaviour in float glass; optical and physical properties of bismuth borate glasses related to structure; density, refractive index and related properties of mixed alkali borate glasses; crystallisation of iron phosphate glasses; stress corrosion reaction of silica glass and water; and a communication on the optical absorption and ESR of Cu^{2+} in titanate glasses.

REACTIONS AT GLASS SURFACES

SGT president Dr Peter Sewell opens the Reactions at Glass Surfaces meeting.

Glass surfaces provide unique substrates for chemical reactions to take place. The surface is where many new, value added products such as 'K' Glass are being developed, which help to generate the earnings growth of a mature industry. Reactions at glass surfaces was the topic of a joint meeting between the Basic Science and Technology Committee of the Society of Glass Technology and the Applied Solid State Chemistry Group of the Royal Society of Chemistry. The one day conference was organised by the Society and hosted by the Pilkington Technology Centre, at Lathom, on Wednesday 29 October 1997.

The meeting was well attended. Delegates came from universities and from industry throughout the UK, as well as from Germany, Holland, France, Switzerland, Japan and USA. The first papers were presented at 11.00am. People arriving early were given a guided tour of the extensive Pilkington Technology exhibition. The meeting was opened by Dr Peter Sewell, President of the Society of Glass Technology and Chief Research Scientist at Pilkington. The meeting was split into three sessions with presentations on surface reactions, the glass/coating interface and coating growth.

SURFACE REACTIONS ON GLASS

Professor Neville Greaves of Aberystwyth University compared measurements of the bulk structure of silicate and aluminosilicate glasses with those of newly fractured, polished and powdered samples. Molecular dynamics simulations were set against experimental results from EXAFS, NMR, SAXS and others. The mixed alkali effect was also introduced as a further factor to explore. The chemical properties expected from virgin glass surfaces were reviewed in the context of EXAFS experiments on polished and powdered silicate and aluminosilicate glasses.

Chemical state information, which can be obtained using photoelectron spectroscopy, could be of great benefit to the understanding of glass structure. Dr Dianne Holland (Warwick University)

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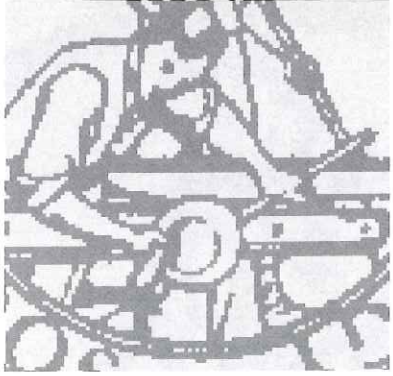


explained how PES accesses only the first few nanometres of surface and thus the relevance of any data to the bulk has to be small. Examples of these inconsistencies are shown, as well as the effects the measurement technique itself has on reduction or charge induced migration.

GLASS/COATING INTERFACES

Pilkington has had an electron spectrometer for more than 15 years, capable of both x-ray photoelectron spectroscopy and Auger electron spectroscopy. Dick Chappell described its use in determining the composition and thickness of coatings on glass which has been crucial to the development, understanding and marketing of new coating systems.

Modelling has taken advantage of the advances in computing power by resolving more complex problems such as the reactions at surfaces and the growth of coatings. Dr Liz Colbourn of Oxford Materials described how crystalline surfaces were initially examined, although amorphous materials can in principle be modelled. Mesoscopic modelling has been developed which allows realistic time and size scales to be examined. New methods which combine electronic and dynamic effects were discussed. Both will revolutionise understanding of the surface structure over the next ten years.

COATING GROWTH

Professor Mike Hitchman (University of Strathclyde) has used glass as the substrate, such as TiO_2, for photoelectrocatalytic compounds used in the degradation of organic compounds. An example of the application of this technique is the destruction of chemical weapons. Leakage and the release of such compounds is a major concern. The efficiency of destruction depends on the chemical vapour deposited film properties. This allows the construction of long tubular reactors for treatment of large volumes of waste pollution at low levels.

Strategies for the study of chemical processes occurring on glass surfaces were described by Professor Martin Pemble (University of Salford). Conventional surface science techniques examine the surface under artificial conditions of high or ultra-high vacuum. Professor Pemble has adopted optical methods such as second harmonic generation, surface photoabsorption and surface infrared spectroscopy to examine the surface under 'real' conditions.

Photovoltaic solar cells are a rapidly expanding market for both terrestrial and space application. Professor Stuart Irvine has been examining the poorly understood interface between CdTe/CDs thin films and the glass surface. This is further complicated by the presence of a thin conducting oxide coating which acts as a window for solar radiation and a contact to the CDs side of the junction. New results using metal organic chemical vapour deposition to grow semiconductor films under controlled conditions have achieved the requisite large grain size. Electrical doping, which means a high temperature annealing step, can be skipped entirely. Results indicate that glass provides an excellent surface for catalysing MOCVD of II-VI semiconductors.

POSTER PAPERS

About 20 poster papers were available for viewing between sessions. Subjects covered included interactions of iron and tin in the float glass surface; MOCVD of SnO_2 for gas sensor applications; deposition of In_2S_3 on glass from novel single source precursors; cathodoluminescence changes resulting from humidity treatments of float glass; and low energy ion beam SIMS of float glass surfaces among others.

CONFERENCE PROCEEDINGS

The presentations and posters given at the Reactions at Glass Surfaces meeting will be published in Topical Issues in Glass, Volume 2, price £20 to members and participating Societies (£30 to non-members). ■

Society of Glass Technology, 20 Hallam Gate Road, Sheffield S10 5BT. Tel 0114 2663168. Fax 0114 2665252.

GLASS OPPORTUNITIES – THE CHALLENGE OF WASTE MANAGEMENT

The Society of Glass Technology's Spring Meeting will discuss the problems and solutions of waste management available to all glass making sectors.

The format of the meeting has been changed this year and there will no longer be a dinner and dance but a conference dinner instead, on the Thursday evening. The meeting will start with a works visit on the Wednesday afternoon and papers will commence on the Thursday morning. The conference will end with a late lunch on the Friday.

The Dunkenhalgh Hotel is a 700 year old country house set amidst 17 acres of parkland. The building has been restored and extended and has a leisure club and swimming pool. It is easily accessible from the M65 and M6, the nearest airport being Manchester International, which is about 45 minutes drive away. Blackburn railway station is about 10 minutes away.

Accommodation is available at the Dunkenhalgh Hotel or in smaller guest houses in the area. Bed and breakfast accommodation at the Hotel will cost £66.50 in a single room and £90.00 in a double or twin per night.

A **visit** to Philips Components at Simonestone has been arranged for the Wednesday afternoon.

Local Section Reception. The Scottish Section will host this on Wednesday 13 May in the hotel.

This will be held in the hotel on the evening of Thursday 14 May. Everyone coming to the conference and their guests will be welcome to attend.

The outgoing President Dr Peter Sewell will present his **address** at 4.00pm on Thursday 14 May.

The Society **Annual General Meeting** will be held at 4.45pm on Thursday 14 May, following the Presidential address.

PROGRAMME

Thursday 14 May

In the morning the keynote lecture will be followed by papers on the vitrification of nuclear waste, by C Scales (BNFL); an overview of the Glass Batch Furnace and Refractories Committee Clinic Meeting, by J Osborn (Beatson Clark); the wastewater recycling process, by a speaker from CETCO and a paper on lifecycle analysis.

In the afternoon there will be papers on the experiences of vitrification, by K McNeill (VERT); wasted energy by P Stevenson (ETSU); recycled refractory materials, by a speaker from Hepworth Refractories.

Friday 15 May

The day will begin with Management of waste management by D Norman (Pilkington). This will be followed by vitrification of asbestos, by a speaker from BNFL; IPPC by G Goode (British Glass) and an analysis of refractories, by M West (Sheffield Hallam University). Vitrification - End Product Development will be presented by D Roberts (VERT); Cullet and the Small User/Producer by D Batt-Rawden (ETSU); Recycling of Polished Glass Waste by S Slade (Pilkington) and finally, Fusion Cast Refractory Disposal by I Whittaker (SEPR).

The final paper will be followed by lunch and the close of the conference. ■

SGT NEWS

NORTH AMERICAN SECTION NEWS

The North American Section of the Society held its 1997 Annual Meeting at the Pennsylvania State University. The topic of discussion was the ever popular Glasses for the Display Industry. The meeting was held in conjunction with the Pennsylvania Ceramic Society Annual Meeting on 12 September. Although only 36 people attended, it was a congenial event and was well chaired by Professor Carlo Pantano of Penn State University.

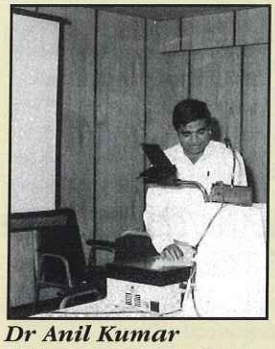
The talks arranged by the Society were:

- Processing of active-matrix LCDs and other displays presented by Robert Davis, Centre for Electronic Materials and Processing, Penn State University.
- Accurate glass and flat panel display depth profiling by secondary ion mass spectroscopy by T H Buyuklimanli, S W Novak and C W Magee, Evans East, Plainsboro, NJ.
- Glass for advanced flat-panel displays by Dawne Moffatt-Fairbanks, Corning Incorporated, Corning, NY.
- Fabrication of plasma displays by Donald M Trotter, Corning Incorporated, Corning, NY.
- Thermochemical approach for modelling high temperature interface reactions with glass by Karl Spear and Carlo Pantano, Penn State University.
- Foaming and volatilization in glass melts by Hoachuan Jiang and William LaCourse, Alfred University.

An excellent discussion followed the talks and the programme appeared to have been well-received. A short business meeting followed where future events and venues were discussed. There was also the suggestion that the Fall Glass Division Meeting of the American Ceramic Society could be combined with a future event. The secretary called for nominations at the meeting and by post for a new Chair and new Secretary. The two nominations for Chair were Ron Argent and Alastair Cormack and Paige Higby and Wesley King were nominated as Secretary. In a closely run race Ron Argent secured the Chair and Paige Higby was chosen as Secretary.

Dr Paige Higby, the new Secretary, can be contacted at: Libbey-Owens-Ford Technical Centre, 1701 East Broadway, Toledo, OH 43605, USA. Tel: +1 419 247 3731, Fax: +1 419 247 4224, E-mail HYPERLINK mailto:phigby@tcpost1.lof.com ■

THE CONCEPT OF REDOX AND ITS APPLICATION IN GLASS TECHNOLOGY



Dr Anil Kumar delivering his talk on redox and its application in glass technology.

The Indian Section of the Society of Glass Technology organised a seminar on 27 November 1997 at Merchants Chamber of Commerce, Calcutta to discuss the concept of redox and its application in glass technology. Shri C K Somany, the Indian Section Chairman, presided over the meeting attended by SGT members, members of the Eastern India Glass Manufacturers Association, scientists from CGCRI and students from the Ceramic College.

Dr Anil Kumar, scientist at the Central Glass and Ceramic Research Institute, Calcutta explained the basic equation of a redox reaction and the elements undergoing the redox changes in glass. The effect of temperature and composition was discussed as were the colour changes that take place with composition and temperature. Dr Kumar explained how redox numbers are assigned to various batch materials through chemical oxygen demand. Specific examples were given of how batch correction is needed to maintain the same redox number with the change in the source of a given raw material.

The lecture ended with a lively discussion and a vote of thanks by O P Chakravarty, Scientist, Central Glass and Ceramic Research Institute. ■

PROCESS DEVELOPMENT FOR NARROW NECK LIGHTWEIGHT CONTAINERS

The University of Northumbria at Newcastle and the Society of Glass Technology will be holding a one day meeting on Wednesday 3 June 1998 at the Ardsley Moat House, Barnsley on process developments for narrow neck lightweight containers.

The meeting will be chaired by Professor Mohammed Sarwar, Head of Industrial Research and Consultancy Centre, University of Northumbria at Newcastle. There will be eight speakers providing overviews of the problems associated with the narrow neck press and blow process and a detailed look at the influential parameters. Speakers will be from PLM Redfearn, Emhart (UK), Humprenco, British Glass, Rockfield, PLM Limmared and the University of Northumbria at Newcastle.

The cost of the conference will be £33 per person (inclusive of VAT) and including refreshments. The meeting begins at 9.30am and hotel rooms can be reserved at Ardsley House at a special rate. All enquiries should be sent to Jill Costello at the Society of Glass Technology.

LOCAL SECTION CONTACTS

For details of forthcoming local section events in your area, contact the following.
All SGT members and non-members welcome.

London
– Mr P West, United Glass Ltd, Porters Wood, St Albans, Herts AL3 6NY. Tel 01727 59261.

Midlands
– Mr C Baldwin, Stein Atkinson Stordy Ltd, Midland House, Ounsdale Road, Wombourne, Near Wolverhampton WV5 8BY. Tel 01902 324000.

North East
– Mr J Henderson, 44 Woodside Ave, Throckley, Newcastle upon Tyne NE15 9BE. Tel 0191 264 4775.

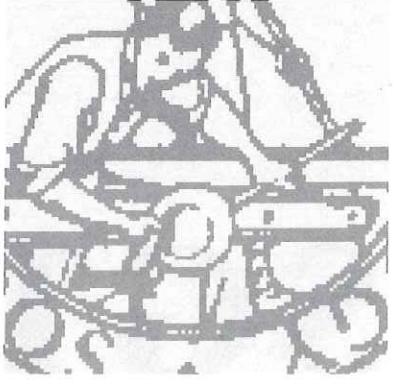
North West
– Dr D Martlew, Pilkington Technology Centre, Hall Lane, Lathom, Ormskirk, Lancs. Tel 01695 54210.

Scottish
– Mr D A Rennie, United Glass Ltd, Glasshouse Loan, Alloa FK20 1PD. Tel 01259 218822.

Yorkshire
– Miss R M Sales, 20 Blackbrook Drive, Sheffield S10 4LS. Tel 0114 2306179.

NORTH AMERICA
– Dr A G Clare, School of Ceramic Engineering and Sciences, New York State College of Ceramics at Alfred University, 2 Pine Street, Alfred, NY 4802-1296, USA. Tel 607 871 2392.

INDIA
– Dr J Mukerji, Central Glass and Ceramic Research Institute, PO Jadavpur University, Calcutta 777 032, India. Tel 473 3496.



TECHNICAL COMMITTEES

Technical Committees are a key element of the Society's operations. They add to the Society's prominence and, through their activities, encourage new members.

ANALYSIS AND PROPERTIES COMMITTEE

Standard sands analysis completed in 1995 is now under revision. The technical committee is preparing a listing of analytical service providers for publication which would be revised every two years. The committee also operates as BSI committee LBI/36/5 and has been deliberating over draft International Standards for the chemical analysis of soda-lime-silica glass.

Ms H M West
Materials Research Institute
Sheffield Hallam University
City Campus
Pond Street
Sheffield S1 1WB
Tel 2533401. Fax 2533501

BASIC SCIENCE AND TECHNOLOGY COMMITTEE

Involved in the Sol-Gel 97, Glasses in Electronics, Durability of Coatings and Non-Oxide Glasses, Reactions at Glass Surfaces conferences. Two members of the committee are preparing a monograph on stress measurement in glasses. The Undergraduate Project Award is co-ordinated and judged by the Basic Science and Technology Committee.

Mr H W McKenzie
Pilkington Technology Centre
Hall Lane
Lathom
Ormskirk
Lancs L40 5UF
Tel 01695 54270. Fax 01695 54506.

ENGINEERING COMMITTEE

Committee meets on a regular basis with the aim of organising clinic meetings.

Mr M Hickman
PLM Redfearn Glass
Monk Bretton Glassworks
Barnsley S71 2QG
Tel 01226 710211.
Fax 01226 716808.

GLASS BATCH FURNACE AND REFRACTORIES COMMITTEES

The combination of the Furnace and Refractories Committees to form this new technical committee was confirmed at Council in February 1997. The committee meets at different venues and includes factory visits or presentations from the host. Revising and updating the Refractories in the Glass Industry publication continues.

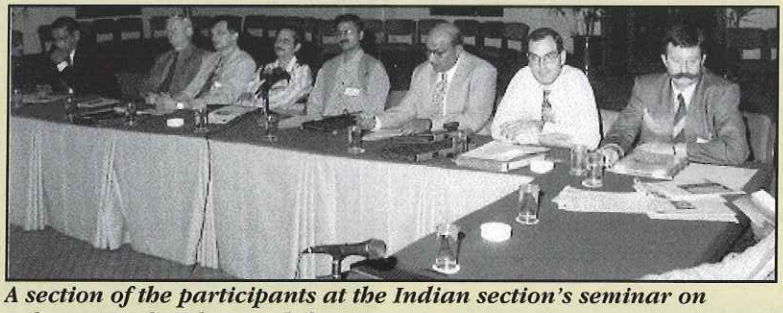
Mr J Osborne
Beatson Clark plc
Hoyle Mill Road
Stairfoot
Barnsley S70 3EU
Tel 01226 731414.
Fax 01226 731214.

HAND-MADE GLASSWARE COMMITTEE

Organised the well attended clinic on Clear and Coloured Glass Compositions. The discussion was lively for the most part but somewhat reserved when it came to discussing practical experience.

Mr J Henderson
44 Woodside Avenue
Throckley
Newcastle-upon-Tyne NE15 9BE
Tel 0191 264 4775.
Fax 0191 264 6998.
E-mail HYPERLINK
mailto:henderson.a@dial.pipex.com

REFRACTORIES FOR GLASS TANK FURNACES



A section of the participants at the Indian section's seminar on refractories for glass tank furnaces.

The Indian Section of the Society of Glass Technology organised a half day seminar on refractories for glass tank furnaces at the Hotel Oberai Grand on 12 December 1997. The meeting coincided with the Executive Committee meeting of the All India Glass Manufacturers Federation. The invited lectures dealt with fusion cast and bonded refractories for the tank proper, silica crown and crown insulation and regeneration. The Indian Section Chairman welcomed the participants and Dr C Ganguly, the chief guest, addressed the audience. He stressed the need to develop newer refractories and also to give importance to indigenously available materials such as zircon from beach sand and hafnia. Industries should join together with the research organisations to develop new refractories.

Following the address six lectures were presented. Bernard Copet of SEPR, France explained the use of fusion cast and bonded refractories for TV glass, flat glass tank furnaces and new products for oxy-fuel combustion. R Srivanivasan of Carborundum Universal, Madras, talked about the exudation behaviour of AZS refractories and its importance in glass tank superstructures. Dr J D Panda of the Dalmia Institute for Scientific and Industrial Research, Rajgangpur spoke about the use of silica bricks for the crown. The use of crown insulation with a high safety factor was read by Dr J Mukherji on behalf of Professor Stan Lutskanov, Lubisol Engineering, Sofia, Bulgaria.
B Pomet of SEPR discussed efficient regeneration practice with cruciform shaped refractories. Finally, the effect of various factors and improved designs on the performance of regeneration checker was disclosed by S A Rashid of Orissa Industries, Rourkella. The seminar ended with a vote of thanks. ■

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